Pesticide Residues in Food

Q: What are the trends in chemicals used on the land and their effects on human health and the environment?(Chemicals to include toxic substances, pesticides, fertilizers, etc.)

The above question pertains to all 'Chemicals' Indicators, however, the information on these pages (overview, graphics, references and metadata) relates specifically to "Pesticide Residues in Food". Use the right side drop list to view the other related indicators on this question.

Introduction

Pesticides are substances or mixtures of substances intended for preventing, destroying, repelling, or mitigating plant or animal pests and may include herbicides, insecticides, fungicides, and rodenticides. More than a billion pounds of pesticides are used in the U.S. each year to control weeds, insects, and other organisms that threaten or undermine human activities (U.S. EPA, 2009). Some of these compounds can be harmful to human health if sufficient quantities are ingested, inhaled, or otherwise contacted (see the Urinary Pesticide indicator). Potential health effects and primary exposure routes vary by chemical. The most common routes of exposure for the general population are ingestion of a treated food source and contact with applications in or near residential sites. Pesticides may also be harmful in the environment when non-target organisms are exposed.

This indicator represents data from the U.S. Department of Agriculture's Pesticide Data Program (PDP), which measures residue levels for hundreds of pesticides and their metabolites in fruits, vegetables, grains, meat, and dairy products from across the country, sampling different combinations of commodities each year. The analysis examines pesticides currently on the market and also includes continued testing for some persistent and bioaccumulative pesticides that have been banned since the 1970s, such as aldrin/dieldrin, heptachlors, and DDT and its metabolites. PDP data collection began in 1991 and includes both domestic and foreign-produced commodities. Results are published in annual reports, which include statistics on the number of pesticide residues detected, the number of residues exceeding the tolerance established by EPA for a given pesticide-commodity pair (Code of Federal Regulations, Title 40, Part 180), and the number of residues detected for which no tolerance has been established. This indicator depicts data from 1994 to 2009; data from before 1994 are considered less reliable. Between 1994 and 2009, the number of food samples analyzed per year ranged from a low of 5,771 (1996) to a high of 13,693 (2005), with a general increase over time.

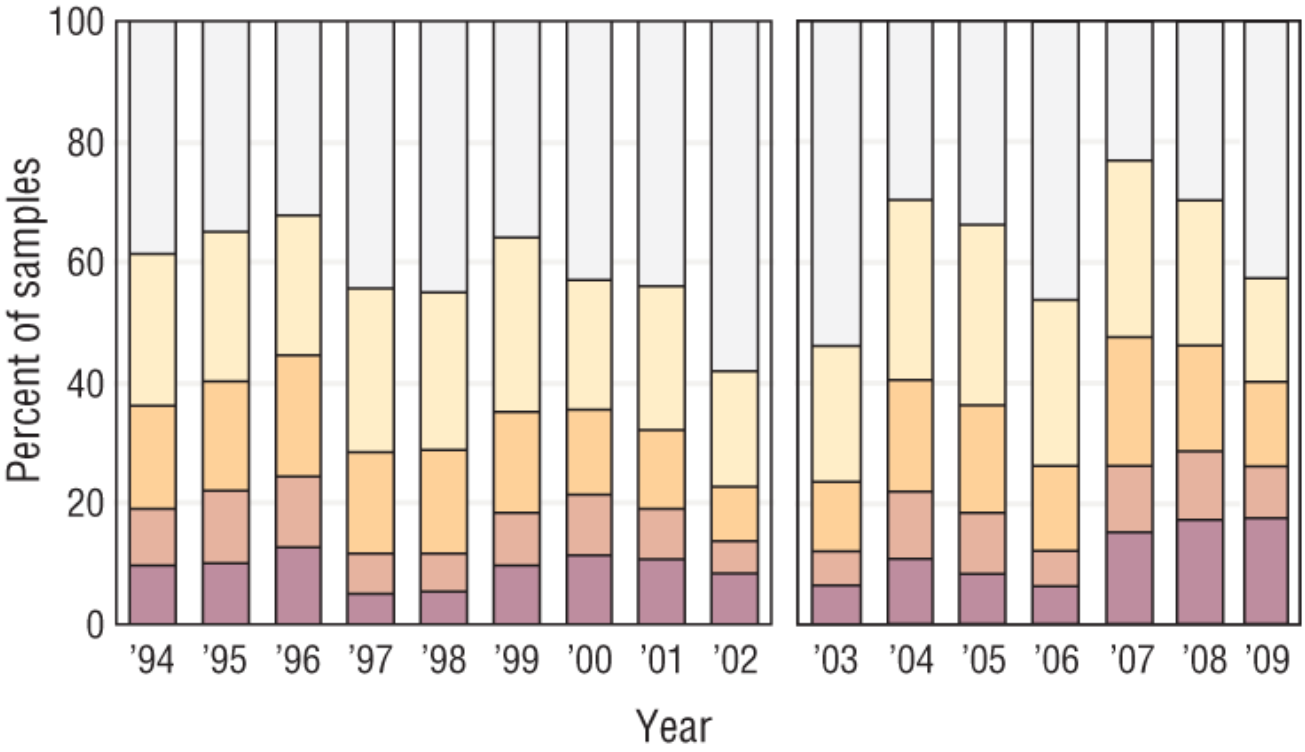
What The Data Show

The percent of samples with no detectable pesticide residues generally increased during the period from 1994 to 2002 (Exhibit 4-21). Samples with no detects accounted for 38.5 percent of samples analyzed in 1994 and rose to 57.9 percent of samples in 2002. Data for 2004-2009 show a lower percentage of samples with no detects than 2003 data, going from 53.9 percent of samples in 2003 to 23.1 percent in 2007, then increasing to 42.6 percent in 2009. The largest increase in detects in the 2003-2009 time frame, almost 64 percent, was in those samples with detection of four or more residues. These trends in number of detections have occurred at the same time that analytical limits of detection for various compounds have been decreasing, allowing the instruments to pick up ever smaller concentrations.

Exhibit 4-22 illustrates the percentage of samples in which at least one pesticide residue was detected at a concentration exceeding the tolerance established by EPA for a given pesticide-commodity pair. The percentage of samples exceeding EPA tolerance values increased from 0.05 percent in 1994, peaked at 0.50 percent in 2008, and decreased to 0.39 percent in 2009.

Exhibit 4-21. Pesticide detections in food in the

U.S., 1994-2009[a,b]



[a]**Coverage:** Based on a survey of fruits, vegetables, grains, meat, and dairy products acorss the U.S., with different combinations of commodities sampled in different years. Each commodity group is tested for varying numbers of parent pesticides, metabolites, degradates, and/or isomers.

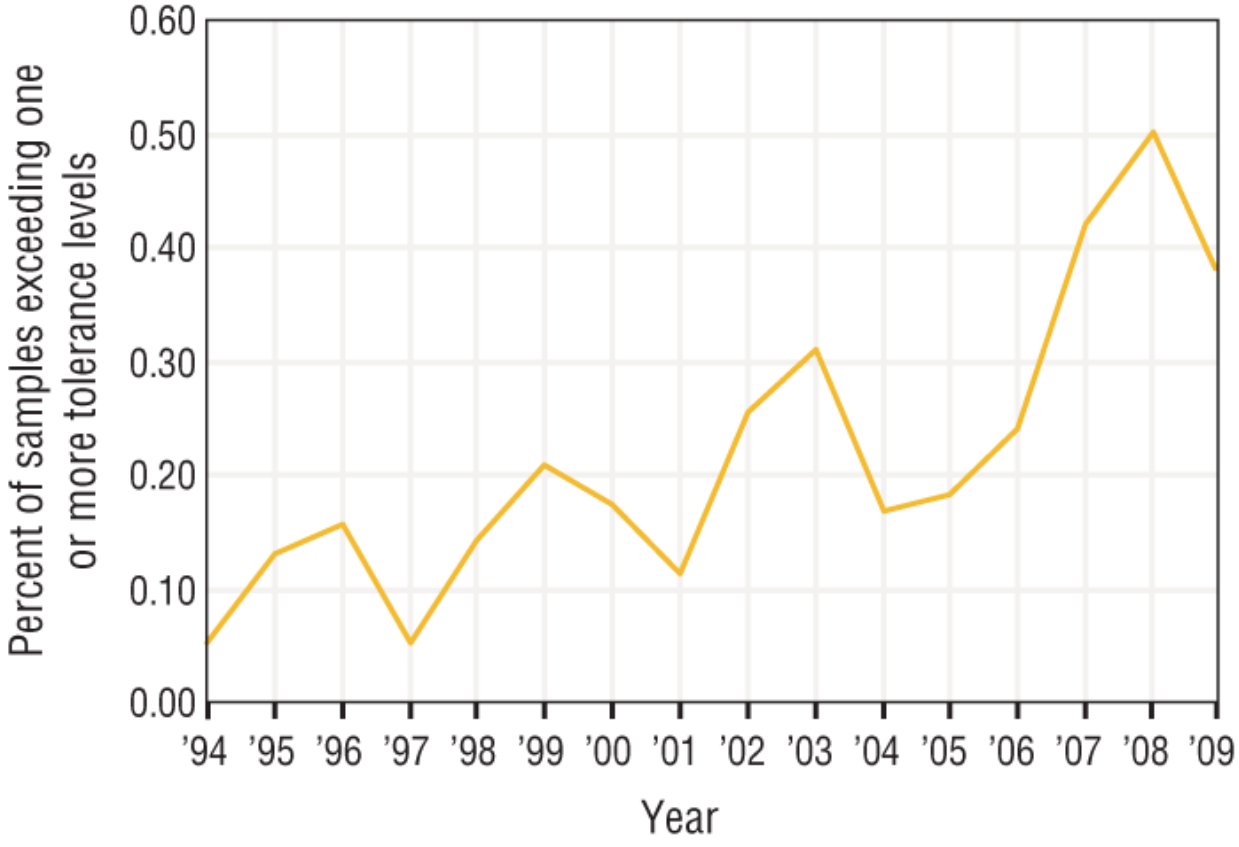
Number of residues detected:[b]
- 0
- 1
- 2
- 3
- 4 or more

[b]Data from 2003 to 2009 are not comparable to prior years due to a difference in how detects are counted. Beginning in 2003, parent compounds and their metabolites are combined to report the number of "pesticides" rather than the number of "residues," as reported prior to 2003. For example, a sample with positive detections for metabolites of a single pesticide–Endosulfan I, II, and sulfate, for example– would have been counted as three residues detected in the 2002 report. That same sample would be counted as just one pesticide detected in

the 2003 report.

Data source: *USDA Agricultural Marketing Service, 1994-2009*

Exhibit 4-22. Pesticides exceeding EPA tolerance levels in food in the U.S., 1994-2009[a]



[a]**Coverage:** Based on a random selection of fruits, vegetables, and other food across the U.S., with different combinations of commodities sampled in different years. The number of pesticides and their metabolites for which samples are analyzed varies depending on the commodities tested.

Data source: *USDA Agricultural Marketing Service, Pesticide Data Program, 1994-2009*

Limitations

- As Exhibit 4-21 explains, PDP data showing percent of samples with a given number of pesticides detected from 2002 and earlier cannot be compared directly with data gathered after 2002. (Before 2003, each compound detected was counted separately; beginning in 2003, measurement of a parent compound and/or any of its metabolites was counted as a single detect.)

- The PDP does not sample all commodities over all years, so some gaps in coverage exist. Differences in the percent of detections for any given pesticide class might not be due to an increase (or decrease) in the predominance of detectable residues. Instead, these differences might simply reflect the changing nature and identity of the commodities selected for inclusion in any given time frame.

- The indicator measures pesticide residue related to dietary intake, which does not directly correlate to toxicological effects in humans or effects on the environment.

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Data Sources

Data for this indicator were obtained from a series of annual summary reports published by the PDP (USDA Agricultural Marketing Service, 1996-2011). These reports are all available from http://www.ams.usda.gov/science/pdp/. The Food and Drug Administration also collects data (not reported here) on pesticide residues in cooked food that may be a source of chemicals in human diets. These data are available at http://www.fda.gov/Food/FoodSafety/FoodContaminantsAdulteration/TotalDietStudy/ucm184293.htm.

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